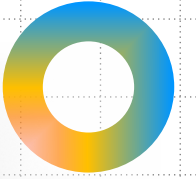




Python Programming

Comments & Markdown

Dr. Chun-Hsiang Chan
Department of Geography
National Taiwan Normal University



Outlines

- Comments
- Markdown
 - Web Mode
 - LaTeX



Why Do We Need Comments in Codes?

- In large-scale software projects, collaboration among multiple developers is often essential. However, each team member may have distinct coding styles, naming conventions, and architectural preferences. These differences can complicate code reviews, create friction during development, and even introduce critical bugs if the code base becomes inconsistent. Over time, misalignment in coding practices can lead to higher maintenance costs and make troubleshooting significantly more difficult.

Why Do We Need Comments in Codes?

- Conversely, when working on smaller projects, it's surprisingly easy to forget design details and implementation logic—especially if the code or algorithm isn't well documented. Without a clear record of why certain choices were made, developers may be forced to rewrite or re-implement existing components to make minor adjustments. This rework happens simply because the original reasoning, structure, or approach has been lost, leading to unnecessary duplication of effort.

Comments – Single Line

- In both the Python file (.py) and the Jupyter Notebook (.ipynb), we have two comment styles for single-line comments and multiline comments.

```
# single comment
A = [1.2, 3.14, 100] # this is a list
print(A)
# 1st line comment
# 2nd line comment
print(B)
```

Comments – Multiline

- Multiline comment style in both Jupyter Notebook and python file:

```
# single comment  
# 1st line comment  
# 2nd line comment  
print(123)
```

Comments – Multiline

- Multiline comment style in Python file:

```
"""
```

```
I am comment  
blablabla
```

```
"""
```

```
print(123)
```

```
'''
```

```
I am comment, too  
blablabla
```

```
'''
```

Markdown

- In Jupyter Notebook, we have another powerful way to make comments in your file.

The image consists of two side-by-side screenshots of the Jupyter Notebook interface. The left screenshot shows the 'Cell' menu open, with the 'Markdown' option highlighted. A blue arrow points to the first cell, which is labeled 'In []:' and contains the text 'Click here!'. The right screenshot shows the same notebook after the first cell has been converted to a Markdown cell. The cell now contains the text 'Here is the markdown area!' and is also highlighted with a blue box. The second cell in the notebook on the right contains the code 'import os' and 'import math'. The Jupyter logo and 'Comment Last Checkpoint: 2024/09/20 (unsaved changes)' are visible at the top of both screenshots.

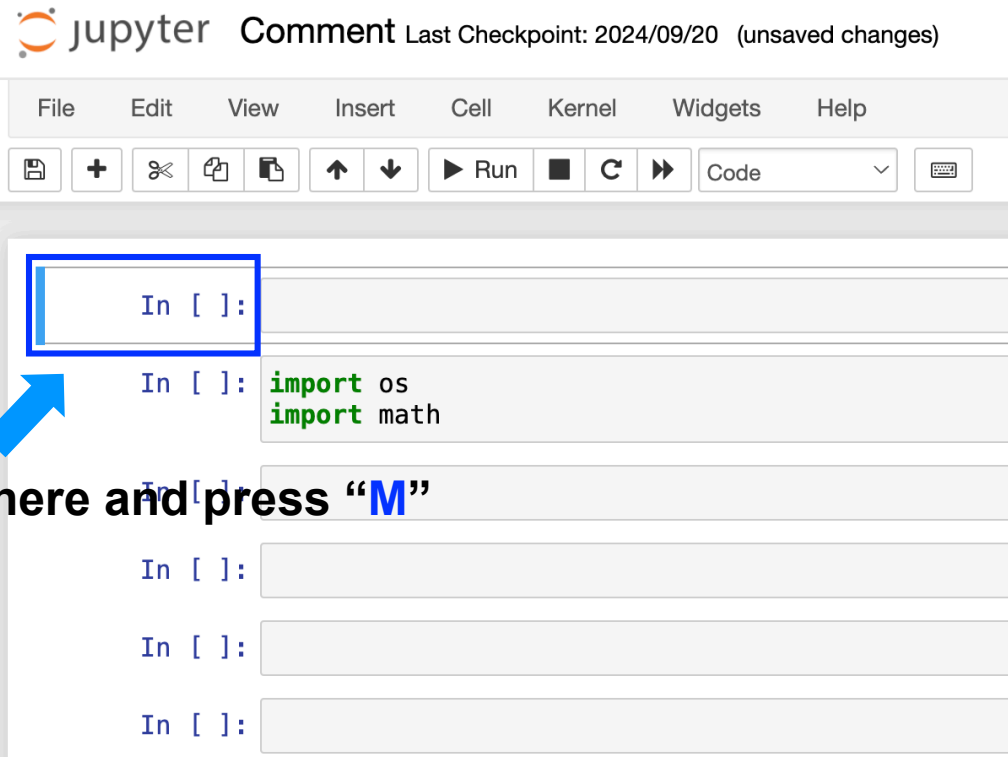
Click here!

Click here!

Here is the markdown area!

Markdown

- You may use a shortcut.
- Click the block and press “**M**”.



The screenshot shows the JupyterLab interface with a menu bar (File, Edit, View, Insert, Cell, Kernel, Widgets, Help) and a toolbar with icons for saving, adding, deleting, copying, pasting, undo, redo, and running code. The 'Code' dropdown menu is open. A blue box highlights the first code cell, which contains the prompt 'In []:'. A blue arrow points to this box with the text 'Click here and press “M”'.

jupyter Comment Last Checkpoint: 2024/09/20 (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help

Save Add Delete Copy Paste Undo Redo Run Stop Clear All Code

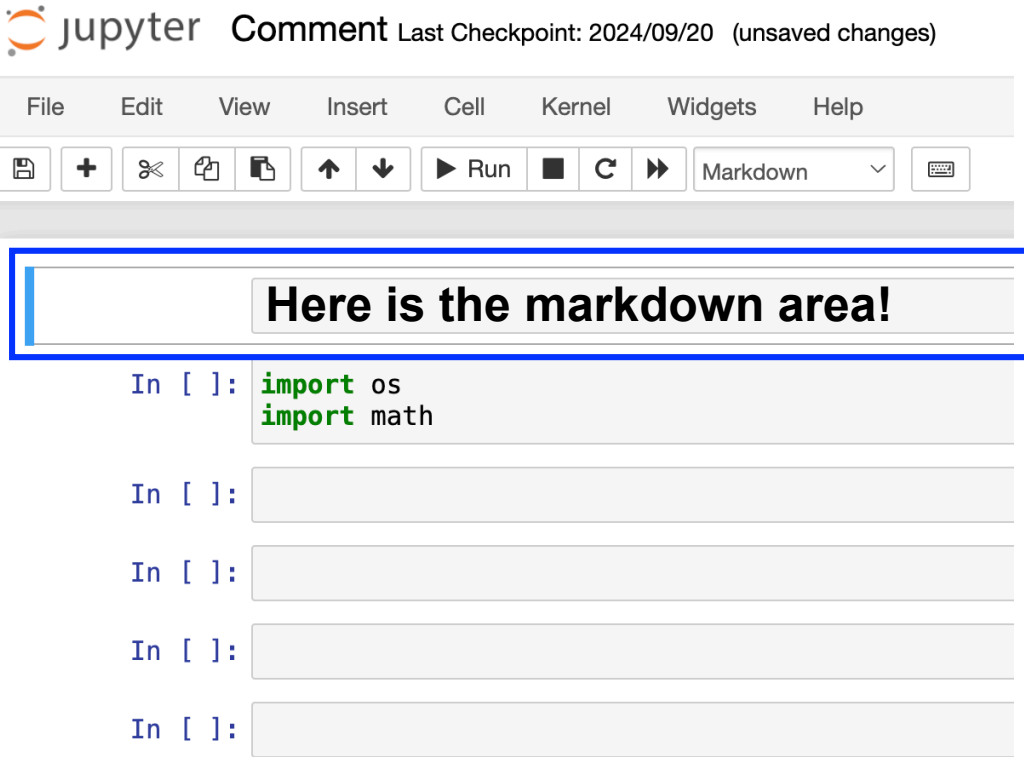
In []:

In []: `import os`
`import math`

In []:

In []:

In []:



The screenshot shows the JupyterLab interface after the first code cell has been converted to a markdown cell. The 'Markdown' dropdown menu is now selected in the toolbar. The first cell now contains the text 'Here is the markdown area!'. The second code cell remains unchanged.

jupyter Comment Last Checkpoint: 2024/09/20 (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help

Save Add Delete Copy Paste Undo Redo Run Stop Clear All Markdown

Here is the markdown area!

In []: `import os`
`import math`

In []:

In []:

In []:

In []:

Markdown

- The coding style of Markdown is similar to HTML.

jupyter Comment Last Checkpoint: 2024/09/20 (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help

Save + Cut Copy Paste Up Down Run Stop Refresh Markdown Keyboard

```
# level 1
## level 2
### level 3
#### level 4
##### level 5
without any level
```

In []: `import os`
`import math`



jupyter Comment Last Checkpoint: 2024/09/20 (autosaved)

File Edit View Insert Cell Kernel Widgets Help

Save + Cut Copy Paste Up Down Run Stop Refresh Code Keyboard

```
level 1
level 2
level 3
level 4
level 5
without any level
```

In []: `import os`
`import math`

Markdown

- The coding style of Markdown is similar to HTML.

The image displays two screenshots of the Jupyter Notebook interface, illustrating the process of converting a text cell to a Markdown cell. A large blue arrow points from the top screenshot to the bottom one.

Top Screenshot: The Jupyter Notebook interface shows a text cell containing the text: "Dr. Chun-Hsiang Chan holds a Ph.D. from the Department of Geography at National Taiwan University. Currently, he is an assistant professor at Department of Geography, National Taiwan Normal University." The interface includes a menu bar (File, Edit, View, Insert, Cell, Kernel, Widgets, Help) and a toolbar with icons for saving, adding, and running cells. The status bar indicates "Notebook saved", "Not Trusted", and "Python 3 (ipykernel)".

Bottom Screenshot: The same Jupyter Notebook interface is shown, but the cell is now a Markdown cell. The text is displayed in a larger font and is wrapped. The status bar indicates "Not Trusted" and "Python 3 (ipykernel)".

Markdown

- Therefore, we need to use “`
`” to make a newline.


The image displays two screenshots of the Jupyter Notebook interface, illustrating the use of the `
` code to create a new line in a Markdown cell.

Top Screenshot: The notebook shows a Markdown cell with the text: "Dr. Chun-Hsiang Chan holds a Ph.D. from the Department of Geography at National Taiwan University. `
`Currently, he is an assistant professor at Department of Geography, National Taiwan Normal University." The code `
` is highlighted with a blue box. A large blue arrow points from this box to the bottom screenshot.

Bottom Screenshot: The notebook shows the same Markdown cell after execution. The text is now formatted with a new line: "Dr. Chun-Hsiang Chan holds a Ph.D. from the Department of Geography at National Taiwan University." followed by a new line "Currently, he is an assistant professor at Department of Geography, National Taiwan Normal University." A blue box highlights the end of the first line, and a blue arrow points from the `
` code in the top screenshot to this box.

Markdown – Web Mode

- If you want to add some styles for your markdown, then you may read HTML and CSS references.

jupyter Comment Last Checkpoint: 2024/09/20 (unsaved changes)  Logout

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3 (ipykernel) O

⏏ + ✂ 📄 📄 ⬆ ⬆ ▶ Run ■ ↺ ▶ Markdown 🖨

```
<div>
  <p>
    <b><font color='blue'>Dr. Chun-Hsiang Chan</font></b> holds a Ph.D. from the <i>Department of Geography at
    National Taiwan University</i>. <br/>Currently, he is an <b><i>assistant professor</i></b> at Department of
    Geography, National Taiwan Normal University.<br/>
  </p>
</div>
```

Dr. Chun-Hsiang Chan holds a Ph.D. from the *Department of Geography at National Taiwan University*.
Currently, he is an **assistant professor** at Department of Geography, National Taiwan Normal University.

Please see my *HTML* and *CSS* slides in [Web Crawler Practice](#).

Markdown – LaTeX

- **LaTeX** is a powerful tool for typing mathematical equations.

Evaluation Metrics

R Squared (R^2):

R squared, also called the coefficient of determination, describes the percentage of explanation of dependent variables by parameters (independent variables). In general, the model fitting results could be divided into two parts: residual sum of squares and regression sum of squares.

(1) Residual Sum of Squares:

\$\$
SSR = SS_{\text{res}} = \sum_{i=1}^n (y_i - \hat{y}_i)^2
\$\$

where y_i is the ground truth values (dependent variable) and \hat{y}_i is the predicted values.

(2) Total Sum of Squares:

\$\$
SST = SS_{\text{total}} = \sum_{i=1}^n (y_i - \bar{y})^2
\$\$

where y_i is the ground truth values (dependent variable) and \bar{y} is the average value of observation.

Hence, the **R squared** could be calculated by

\$\$
R^2 = 1 - \frac{SSR}{SST} = 1 - \frac{SS_{\text{res}}}{SS_{\text{total}}} = 1 - \frac{\sum_{i=1}^n (y_i - \hat{y}_i)^2}{\sum_{i=1}^n (y_i - \bar{y})^2}
\$\$

Markdown – LaTeX

- Here is the result!

Evaluation Metrics

R Squared (R^2):

R squared, also called the coefficient of determination, describes the percentage of explanation of dependent variables by parameters (independent variables). In general, the model fitting results could be divided into two parts: residual sum of squares and regression sum of squares.

(1) Residual Sum of Squares:

$$SSR = SS_{res} = \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

where y_i is the ground truth values (dependent variable) and \hat{y}_i is the predicted values.

(2) Total Sum of Squares:

$$SST = SS_{total} = \sum_{i=1}^n (y_i - \bar{y})^2$$

where y_i is the ground truth values (dependent variable) and \bar{y} is the average value of observation.

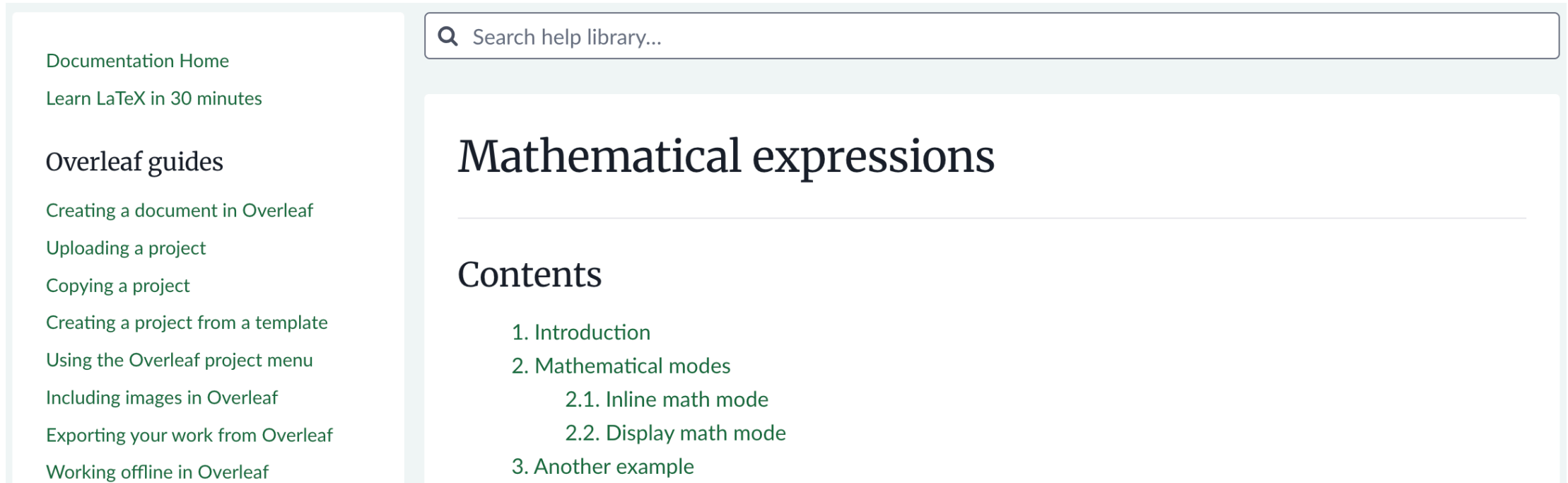
Hence, the **R squared** could be calculated by

$$R^2 = 1 - \frac{SSR}{SST} = 1 - \frac{SS_{res}}{SS_{total}} = 1 - \frac{\sum_{i=1}^n (y_i - \hat{y}_i)^2}{\sum_{i=1}^n (y_i - \bar{y})^2}$$

Markdown – LaTeX

- If you want more information about LaTeX.
- Please see information.

https://www.overleaf.com/learn/latex/Mathematical_expressions



The screenshot shows the Overleaf help library interface. On the left is a sidebar with navigation links. The main content area has a search bar at the top, followed by the title 'Mathematical expressions' and a 'Contents' section with a list of topics.

Documentation Home
Learn LaTeX in 30 minutes

Overleaf guides

- Creating a document in Overleaf
- Uploading a project
- Copying a project
- Creating a project from a template
- Using the Overleaf project menu
- Including images in Overleaf
- Exporting your work from Overleaf
- Working offline in Overleaf

Search help library...

Mathematical expressions

Contents

1. Introduction
2. Mathematical modes
 - 2.1. Inline math mode
 - 2.2. Display math mode
3. Another example

The End

Thank you for your attention!

Email: chchan@ntnu.edu.tw

Website: <https://toodou.github.io/>

